CLAIMS

1. A method of transmitting a digital signal from a transmitter to a receiver in a radio system, the method comprising:

the transmitter transmitting at least a part of the signal via at least two different transmit antenna paths; and

the receiver receiving the signal;

wherein the transmit power of the signals to be transmitted via different transmit antenna paths is weighted with respect to one another in the transmitter by means of changeable weighting coefficients determined for each transmit antenna path.

2. A method according to claim 1, wherein the receiver performs measurements on the received signals that were transmitted via the different transmit antenna paths;

the receiver signals to the transmitter the weighting coefficient data formed on the basis of the measurements;

the transmitter forms weighting coefficients by means of the weighting coefficient data signalling.

3. A method according to claim 2, wherein

the transmitter forms a quality value for the weighting coefficient data signalling it has received;

the transmitter forms weighting coefficients by means of the quality value of the weighting coefficient data signalling and the signalling itself.

4. A method according to claim 2, wherein the values of the weighting coefficients are predetermined, and the predetermined values of the weighting coefficients are divided into different groups, each of which has a particular weighting coefficient for each transmit antenna path, the weighting coefficient data signalling comprising information about which group of weighting coefficients the receiver wants to be used.

5. A method according to claim 2, wherein the weighting coefficient data comprises information about the transmit antenna path via which the signal with the best quality value was transmitted.

6. A method according to claim 2, wherein the weighting coefficient data comprises differential information indicating how the ratios of the weighting coefficients for the transmit antenna paths are changed differentially.

7. A method according to claim 2, wherein the weighting coefficient data comprises at least one channel parameter measured by the receiver.

8. A method according to claim 2, wherein the transmit antenna paths are connected to at least two different base stations of a network part in the radio system.

9. A method according to claim 1, wherein the weighting coefficients used in the transmission are signalled to the receiver.

10. A method according to claim 9, wherein the weighting coefficients are signalled to the receiver by means of an identification sequence which is inserted in the transmitted signal and which varies depending on the weighting of the signal.

11. A method according to claim 9, wherein the weighting coefficients are signalled to the receiver by means of modulation, spreading or coding of the signal specifically for each transmit antenna path.

12. A method according to claim 4, wherein identification data for the group of weighting coefficients used in the transmission is signalled to the receiver by means of identification bits inserted in the transmitted signal.

13. A method according to claim 3, wherein when the quality value for signalling falls below a predetermined threshold value, the weighting coefficients are not changed.

14. A method according to claim 3, wherein when the quality value for signalling falls below a predetermined threshold value, the weighting coefficients are set to an equal value over each transmit antenna path.

15. A method according to claim 3, wherein when the quality value for signalling exceeds a predetermined threshold value, the weighting coefficients are changed.

16. A method according to claim 1, wherein signals to be transmitted via two different transmit antenna paths are as mutually orthogonal as possible.

17. A method according to claim 16, wherein the orthogonality is implemented by using a different spreading or channel code for each transmit antenna path.

18. A method according to claim 16, wherein the orthogonality is implemented by using a different transmission frequency for each transmit antenna path.

19. A method according to claim 16, wherein the orthogonality is implemented by using a different slot for each transmit antenna path.

20. A method according to claim 1, wherein the signal is coded in order to minimize transmission errors in the transmission channel.

21. A method according to claim 20, wherein the coding is space-time coding.

22. A method according to claim 21, wherein the space-time coding is space-time block coding.

23. A method according to claim 21, wherein the space-time coding is space-time trellis coding.

24. A method according to claim 1, wherein the transmit antenna paths are connected to one base station of the network part in the radio system.

25. A method according to claim 1, wherein the transmitter is situated in a radio network subsystem of the radio system network part, and the receiver is situated in a user equipment of the radio system.

26. A method according to claim 1, wherein a user equipment of the radio system determines the weighting coefficients used by the network part of the radio system in transmitting to the user equipment in question.

27. A method according to claim 1, wherein the network part of the radio system determines itself the weighting coefficients it uses in transmission.

28. A method according to claim 27, wherein the network part of the radio system takes into account the loading of each power amplifier over the transmit antenna path when it makes the decision.

29. A method according to claim 1, wherein a transmit antenna path is implemented by means of an antenna structure that provides phasing.

30. A method according to claim 29, wherein the phasing is determined by means of channel parameters signalled by the receiver.

31. A method according to claim 29, wherein the phasing of transmission is determined by means of signals that have arrived at the same antenna elements.

32. A method according to claim 29, wherein transmissions are sent from at least one antenna element with at least two different phases or antenna beams, such that signals to be transmitted with different phases have different pilot sequences, identification sequences, structures or different coding, preferably different parts of a space-time code, by means of which

- beam channel parameters are estimated,
- beam signals are combined,
- weighting coefficient information for the beams is calculated and signalled to the transmitter.

33. A radio system for transmitting a digital signal, comprising
a transmitter for transmitting a signal;
at least two transmit antenna paths that can be connected to the transmitter;
a receiver for receiving the signal;
wherein the transmitter comprises
changing means for changing the weighting coefficients determined for each transmit antenna path with respect to one another, and
weighting means for weighting the transmit power of the signals to be transmitted via different transmit antenna paths by means of weighting coefficients that can be changed with respect to one another.

34. A radio system according to claim 33, wherein
the receiver comprises means for performing measurements on the received signals that were transmitted via the different transmit antenna paths, and means for signalling to the transmitter the weighting coefficient data formed on the basis of the measurements;
the transmitter comprises means for receiving the weighting coefficient data signalling, and the changing means form weighting coefficients by means of the weighting coefficient data signalling.

35. A radio system according to claim 34, wherein the transmitter comprises means for forming a quality value for the weighting coefficient data signalling it has received, and the changing means form weighting coefficients by means of the quality value of the weighting coefficient data signalling and the signalling itself.

36. A radio system according to claim 34, wherein the values of the weighting coefficients are predetermined, and the predetermined values of the weighting coefficients are divided into different groups, each of which has a particular weighting coefficient determined for each transmit antenna path, the weighting coefficient data signalling comprising information about which group of weighting coefficients the receiver wants to be used.

37. A radio system according to claim 34, wherein the weighting coefficient data comprises information about the transmit antenna path via which the signal with the best quality value was transmitted.

38. A radio system according to claim 34, wherein the weighting coefficient data comprises differential information indicating how the ratios of the weighting coefficients for the transmit antenna paths are changed differentially.

39. A radio system according to claim 34, wherein the weighting coefficient data comprises at least one channel parameter measured by the receiver.

40. A radio system according to claim 34, wherein the transmit antenna paths are connected to at least two different base stations of a network part in the radio system.

41. A radio system according to claim 33, wherein the transmitter comprises means for signalling the weighting coefficients used in the transmission to the receiver by means of pilot bits inserted in the transmitted signal.

42. A radio system according to claim 36, wherein the transmitter comprises means for signalling to the receiver identification data for the group of weighting coefficients used in the transmission by means of pilot bits inserted in the transmitted signal.

43. A radio system according to claim 35, wherein when the quality value for signalling falls below a predetermined threshold value, the changing means do not change the weighting coefficients.

44. A radio system according to claim 35, wherein when the quality value for signalling falls below a predetermined threshold value, the changing means set the weighting coefficients to an equal value over each transmit antenna path.

45. A radio system according to claim 35, wherein when the quality value for signalling exceeds a predetermined threshold value, the changing means change the weighting coefficients.

46. A radio system according to claim 33, wherein signals to be transmitted via two different transmit antenna paths are as mutually orthogonal as possible.

47. A radio system according to claim 33, wherein the transmitter comprises means for coding the signal in order to minimize transmission errors in the transmission channel.

48. A radio system according to claim 47, wherein the coding is space-time coding.

49. A radio system according to claim 48, wherein the space-time coding is space-time block coding.

50. A radio system according to claim 48, wherein the space-time coding is space-time trellis coding.

51. A radio system according to claim 33, wherein the transmit antenna paths are connected to one base station of the network part of the radio system.

52. A radio system according to claim 33, wherein the transmitter is situated in a radio network subsystem (RNS) of the radio system network part, and the receiver is situated in a user equipment (UE) of the radio system.

53. A radio system according to claim 33, wherein the user equipment (UE) of the radio system comprises means for determining the weighting coefficients used by the network part of the radio system in transmitting to the user equipment (UE) in question.

54. A radio system according to claim 33, wherein the network part of the radio system comprises decision-making means for determining the weighting coefficients it uses in transmission.

55. A radio system according to claim 54, wherein the decision-making means utilize data about the loading of a power amplifier of each transmit antenna path when they make a decision.

56. A radio system according to claim 33, wherein a transmit antenna path is implemented by means of an antenna structure that provides phasing.